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ABSTRACT

The study attempted to modify the on-task and task completion rates of three kindergarten children by altering the contingencies of reinforcement associated with these two work behaviors. During baseline, a fixed number of tokens was provided for task completion. While the remainder of the class remained in this condition, teacher attention was increased for the target students, and then the contingencies were changed by presenting the fixed number of tokens spread out over the time necessary to complete the task. Increased teacher attention was found to produce reliable increases in on-task rate over the baseline condition. These increases were maintained when the contingencies were reduced but additional significant increases did not occur. The on-task rate of the entire class changed reliably during all the experimental manipulations but no functional relationships were established. Task completion rates did not respond systematically to changes in the experimental conditions.

THE EFFECTS OF A SYSTEMATIC MANIPULATION OF CONTINGENCIES UPON OVERT WORK BEHAVIOR IN A PRIMARY CLASSROOM[1]

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Although reports of classroom behavior modification investigations have spiraled in the past decade, the majority of the studies have been concerned with modifying socially undesirable classroom behaviors. It has been shown repeatedly that a wide range of maladaptive social responses can be altered when teachers systematically apply operant procedures (e.g., McAllister, Stachowiak, Baer, & Conderman, 1969; Schmidt & Ulrich, 1969).

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[1] This study is based upon a dissertation submitted by the senior author to the Department of Educational Psychology, State University of New York at Buffalo in partial fulfillment of the requirements for the degree of Doctor of Philosophy.

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It has also been clearly demonstrated that a variety of stimuli such as teacher attention, access to games and toys, and tokens can be used effectively to reduce inappropriate social behaviors (e.g., Hart, Reynolds, Baer, Brawley, & Harris, 1968; O'Leary & Becker, 1967; Osbourne, 1969).

Considerably less attention, however, has been directed towards promoting low-frequency positive behaviors, especially academic responses. In those studies that have been concerned with academic behaviors (e.g., Bushell, Wrobel, & Michaelis, 1968; Hall, Lund, & Jackson, 1968; Wrobel & Resnick, 1970), little consideration has been given to the effects of manipulating the reinforcement contingencies associated with work behavior.

A typical classroom contingency system might, for example, require that all students complete a specific assignment (e.g., a page of arithmetic problems) before receiving a reward (e.g., a short recess). Such a system places the same demands upon all pupils without regard to individual abilities. However, if individual abilities were considered, students would have contingencies designed to meet their own work level. In a classroom of this type, contingencies might specify that a certain reward be given to a student for completing an entire task while another child might get the same reward for merely attending to his work, that is, on-task behavior.

The present investigation is concerned with altering the contingencies of reinforcement in a primary classroom and determining the effects of such manipulations upon two measures of overt work behavior, on-task behavior and task completion. Because of the nature of the two work measures being studied, a change in contingencies also involves a change in the schedule of reinforcement, although amount of reinforcement

is held constant. No attempt is made in this investigation to separate the effects of the two variables.

Method

Subjects and Setting

From a class of 21 kindergarten pupils at the Frick Elementary School in Pittsburgh, Pennsylvania, three subjects were selected for the study. The school is participating in an experimental program in which the curriculum is designed with an emphasis upon individualized instruction. Each pupil is assigned tasks in accord with his individual abilities. In contrast to typical kindergarten programs, the present curriculum is largely academic. A specific daily assignment is determined by the results of diagnostic tests which are administered to students on a continuous basis. The subjects in the present investigation were chosen because of a low rate of task completion as well as, in the teacher's opinion, a low level of on-task behavior.

In addition to the regular classroom teacher, an assistant teacher and a student teacher were also present throughout each class session. Both the teacher and her assistant had been applying reinforcement principles prior to the onset of the investigation.

Classroom Procedure and Teacher Behaviors

Classes were conducted Monday through Thursday from 12:30 to 3:00 P. M. During the first 15 minutes of each afternoon, children were permitted to work with any of the academic materials present in the room. At the end of this time, each child received a ticket or prescription indicating the tasks he was assigned to do for the day. This

work or conceptual period lasted one hour. Throughout the conceptual period, the teacher functioned as a "traveling teacher." Her role was to initiate work behavior, direct children to materials, check completed tasks, attend to children displaying appropriate behaviors, and dispense tokens for specific academic responses. During this time, the assistant and student teachers were engaged either in testing children or producing work materials.

Following the conceptual period, children were permitted to exchange their tokens for time to engage in different play activities (e.g., painting, clay, slide, doll house, blocks). Prices varied for the different events and all three teachers were needed to monitor this period. Play time lasted approximately 30 minutes and was followed by group activities (e.g., story time, singing) which comprised the final 45 minutes of each day.

Token Reward and Back-Up System

During the conceptual period, tokens consisted of stars penciled in on the prescription next to the task on which the student was working. They were dispensed in accordance with the requirements of each phase of the study. On the first day that the system was put into effect, the children were told that they would have to "buy" the play activities which had previously been free. In addition, they were informed that different activities had different "prices" and that by working they could earn stars, which could then be used to buy access to the activities.

At the end of the conceptual period, each child's stars were totaled and exchanged for yellow rectangular plastic tokens that were attached to a string worn around his neck. To reduce the need for carrying a large number of tokens, yellow tokens with a green stripe were

provided, with each of these tokens equal to five plain yellow tokens. "Change," in the form of plain yellow tokens, was provided by the teachers when required. All tokens that were not spent were returned to the teacher at the end of the play period. Those children who did not earn any tokens were permitted to use conceptual activities or books during this time.

The prices of play activities were determined prior to the beginning of the experiment by observing the number of children who frequented each activity. Throughout the study, the popularity of certain activities changed and it was necessary to alter the prices slightly.

Observation Procedures and Measures of Teacher and Child Behaviors

In addition to the investigator, three observers were present in the room for the duration of the experiment. Data were collected on teacher and child behaviors during the one-hour conceptual period.

Teacher Behaviors - Independent Variables. One observer collected data on the teacher's contacts with each of the three target children. Data were recorded that indicated each positive, negative, and neutral social contact made, and the distribution of tokens to each child.

Positive contacts were recorded in one of two categories: social (positive verbal or physical attention--e.g., "Good boy!"; a pat on the back), or token. These two types of positive contacts could occur either independently or jointly. A joint presentation was recorded as a single positive contact because of the contiguity of the two events. A single positive contact was thus defined as a positive social contact, a token contact, or a simultaneous occurrence of both events. Two measures of the teacher's positive contacts with the target children served as independent variables: the distribution of tokens (either one token contact

was made in which a fixed number of tokens was given for task completion, or this fixed number was spread out over several token contacts while the student was working), and the number of social contacts given independent of token contacts (independent social contacts).

Negative contacts were defined as social responses (e.g., "Sit down!"; removing a child from a work area; "This problem is wrong.") directed towards social or academic behaviors. Neutral contacts were defined as statements (e.g., directions or questions) relating to social or academic behaviors (e.g., "What is this figure?").

Student Behaviors - Dependent Variables. The second observer collected data on two measures of the target students' behavior, on-task rate and task completion rate. These behaviors served as dependent variables. On-task rate was recorded in the following manner: each child was observed separately for five consecutive minutes, with each minute broken down into ten-second intervals. Each interval was scored either "W" for on-task work behavior or "O" for non-work. On-task behavior was defined as manipulating or being oriented towards academic materials for the ten-second interval. A child was permitted to look up, glance around, or raise his hand for a period of time not exceeding three seconds and still receive a "W" for that interval. A "W" was also recorded if the teacher was interacting with the child, provided the child was oriented towards or manipulating the materials for at least seven seconds. All other behaviors (e.g., hitting, kicking, running, returning materials) were recorded as "O". The order in which children were to be observed was rotated on a daily basis, with the first child on any particular day becoming the third to be observed on the following day. If a child was being tested when it was his turn to be observed, he was skipped and the next child observed. The same procedure

was followed if a child was absent. At the end of the class period, the teacher presented this observer with the prescriptions of the target students so that the number of tasks assigned and completed for the day could be recorded.

The third observer collected on-task data on the entire class. Each child was observed for ten seconds and the cycle was repeated for an entire hour. The order of observation each day was randomized. A non-continuous time-sampling technique was used in which each child was observed for ten seconds, the data recorded, and the next child located in the subsequent five-second time period.

Pre-baseline inter-observer reliability was computed by having the investigator make a simultaneous observation record with each observer. Reliability was calculated by taking [# agreements x 100 ÷ (# agreements + # disagreements)]. Reliability checks were made three additional times with each of the two observers who recorded on-task data and on two other occasions with the observer recording teacher data. Reliability averaged 93% (range = 90 to 94%) for the recording of on-task behavior of the target children; 95% (range = 93 to 97%) for the recording of on-task behavior for the class; and 91% (range = 90 to 94%) for the data on teacher interactions.

Procedure

Phase A_1 (baseline). The teacher was instructed to dispense tokens, five stars penciled in on the prescription, to each child in the class upon the correct completion of a task. No instructions were given with regard to the number of positive contacts to be made. The schedule of reinforcement was a fixed ratio schedule in which each child received five stars for each completed task. The phase was ten days in length.

Phase B. During the next four days, the teacher attempted to make approximately three positive contacts per task for each of the three target children. Tokens were still given at the end of the task. Thus, the first two positive contacts were to be independent social contacts while the third was a token contact, either by itself or with a social contact. The procedure for the remainder of the class was identical to that employed in phase A and remained as such for the duration of the experiment.

Phase C_1. For five days, the teacher distributed five tokens to each of the three children while they were working on each task. The contingencies were altered so that reward was now dependent upon on-task rather than task completion behavior. An attempt was made to keep the number of positive contacts at approximately three per task by having the teacher combine social and token contacts. The schedule of reinforcement became a variable interval schedule.

Phase A_2. A return to baseline (A_1) for two days. Although in (A_1) the teacher was not required to make any fixed number of positive contacts per task, the actual number she did make was calculated. Since it approximated one positive contact per task (1.3), the teacher was instructed in (A_2) to deliver approximately one positive contact per task to each of the three children.

Phase C_2. A return to phase C_1. The phase was three days for James and Lynn and two days for Mike.

Phase A_3. A return for one day to baseline for Mike for whom phase A_1 data, collected in five-minute intervals, were not available.

Children who were removed from the work area to be tested were given five stars to make up for time lost in the work area. Testing time generally ranged from seven to ten minutes and, thus, closely

approximated the amount of time necessary to get a task from the shelf, complete it, and receive tokens.

Results

Child Behaviors

Table 1 presents the average percent of on-task behavior displayed by the three target children over the different stages. The data are those collected in five-minute intervals.

Table 1

Mean On-Task Rate for Target Children Based on Five-Minute Data

	Percent of On-Task Behavior		
Phase	James	Mike	Lynn
A_1	28.6	–	26.0
B	33.0	24.1	44.6
C_1	37.2	26.8	38.1
A_2	21.9	15.9	26.6
C_2	20.2	36.6	30.1
A_3	–	21.6	–

Since inspection of the data did not show any dramatic changes as the experimental conditions were altered, each child's data were

examined by a one-way analysis of variance. Since only one child was involved in each analysis, it was decided to perform the test by assuming that every observation in each phase represented the data of a different hypothetical child. Thus, if John was observed on a specific day to have been on-task during 60 of the 120 ten-second observations, the data were analyzed by assuming that 120 children had been observed once, with 60 having been on-task. In addition, the data from phases A_1 and A_2 were collapsed into one condition (A) as were the data from phases C_1 and C_2, (C).

As outlined by Gentile, Roden, and Klein (1972), the analysis was conducted with the phases designated as the traditional between-treatment source of variation and the within-phase variation considered to be the traditional within-treatment source. The rationale and assumptions behind such a procedure are analogous to those presented in a coin-tossing experiment, using a single coin. It can be argued that as with coin tosses, any given response, adequately defined, can be considered independent of every other response in the same class. In the present experiment, each instance of on-task behavior could be considered to be independent of all the others. As with coin tossing, over a specified period of time an unbiased estimate of the mean population of on-task responses can be determined from a random sample of observations on an a priori time-sampling schedule.

Just as one could then test the effects of different temperatures upon coin tossing, it is possible to test, in the present experiment, the effects of different reinforcement contingencies upon on-task responses. Since a reversal design was used in this experiment, any cumulative effects of prior conditions are confounded with treatments. However, a good estimate of the effects of the different contingencies can be obtained

by combining the data from phases A_1 and A_2 and phases C_1 and C_2. These combinations are called A and C, respectively.

The major difficulty in applying the analysis of variance model to single subject data is the argument about a lack of independence of observations. It might be assumed that observations in adjacent treatments are more highly correlated than in non-adjacent treatments. This can create problems if treatments are applied only once. With a reversal design, however, if treatment phases are combined, as described above, correlated observations would, if anything, reduce the size of the F-statistic and tend to operate in the conservation direction.

The analyses indicated significant differences among the three experimental conditions (A, B, and C) for James ($F = 3.5$; d.f. = 2 and 2,602; $p < 0.05$); for Mike ($F = 6.6$; d.f. = 2 and 1,291; $p < 0.01$); and for Lynn ($F = 28.8$; d.f. = 2 and 2,228; $p < 0.01$). Differences between treatments, for each child, were assessed by one-tailed t-tests. It was anticipated that target subjects would display significantly greater on-task behavior in both conditions B and C, when each was separately compared to phase A. The comparison between phases B and C was more important. Since an attempt was made to keep the number of positive contacts received per task equal in these two stages, the only experimental difference was the change in the contingencies for reinforcement. It was predicted that a greater rate of on-task behavior would be observed in stage C. This second directional hypothesis was tested using only Mike's data since he was the only target child whose C phase on-task mean exceeded the B phase mean. For James and Lynn, the B and C conditions were compared using a two-tailed t-test. The significant results are shown in Table 2.

Table 2

Significant T-Ratios for Treatment Comparisons

Child	Significant Comparisons	t	d.f.
James	A vs. B	2.5**	1172
	A vs. C	1.9*	1193
Mike	A vs. B	2.1*	630
	A vs. C	3.9***	934
Lynn	A vs. B	7.0***	1589
	A vs. C	4.6***	1819
	B vs. C	2.8**[a]	1186

[a]Two-tailed test

* $p < 0.025$

** $p < 0.01$

*** $p < 0.005$

The data indicate that for all three children, increased teacher attention (phase B) resulted in a significant rise in on-task performance over the baseline level. While no further significant improvement was obtained over the B level when the contingencies were reduced in phase C, on-task rate was maintained at a level which was still significantly greater than baseline performance. Lynn's rate during phase C, however, was significantly lower than during phase B.

The mean on-task levels of the target students based on data collected on the entire class helped to provide a validity check on the concept of time sampling. These data are shown in Table 3. Since fewer intervals of data were collected, it was hoped that a trend similar to that seen in Table 1, rather than corresponding percentages, would be found. The trend for James proved to be identical to that found in the five-minute data with the exception of stage C_2. Mike's class data also

showed an essentially similar trend with the exception of stage C_1. The class data taken on Lynn differed from her five-minute data in two stages--C_1 and A_2. The unusually high percentage seen in A_2 was due to the fact that Lynn was present for only one day of this phase. On that day, she came in with a bloody nose and was not included in the first three cycles of class data. As a result, her work average was spuriously inflated. Since inter-observer reliability was calculated several times and found to be quite high, discrepancies in the two sets of on-task data for the target students may indicate certain difficulties in the use of the time-sampling technique.

Table 3

Mean On-Task Rate for Target Children Based on Class Data

	Percent Of On-Task Behavior			
Phase	James	Mike	Lynn	Entire Class
A_1	35.1	28.4	35.1	35.9
B	39.4	40.0	39.4	38.7
C_1	41.1	20.2	41.1	42.2
A_2	34.8	9.1	45.5	35.9
C_2	35.2	47.7	26.6	37.9
A_3	–	25.0	–	–

The mean on-task rate of the entire class (minus the target students) for each stage of the study is also shown in Table 3. Stage C_2 consists of just the two days when all target students were in this phase. Interestingly, the class appeared to reliably respond to the manipulation performed upon the target students.

However, since no interaction data were recorded between the teacher and the entire class, it is not possible to demonstrate any functional relationships. However, the data suggest that the class work rate may have been affected by the modification procedures, either through changes in the teacher's responses to the class or through peer influence.

Table 4 presents the percentage of tasks completed by the target students in each stage. The mean number of tasks assigned daily in each phase remained fairly constant for each child, ranging between 6.5 and 7.0 for James, 5.2 and 6.1 for Mike, and 6.0 and 6.6 for Lynn. Inspection of the data in Table 4 indicates no clear-cut relationship between the experimental manipulations and the rate of task completion. Mike's data show a steadily increasing rate of task completion while James' and Lynn's data indicate a random fluctuation. A Spearman rank order correlation indicating the relationship between percent of tasks completed and percent of on-task behavior resulted in a coefficient of 0.0 for each target child. Thus, although there were changes in on-task behavior as a result of the experimental treatments, there were no corresponding changes in task completion behavior

Teacher Behaviors

The data in Table 5 help to assess the critical role played by the teacher in dispensing the requested amount of reinforcement. Table 5 presents data related to the two independent variables manipulated in the investigation: mean token contacts received per task and mean independent social contacts received per task.[3] The sum of these two

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[3] The data presented are mean contacts received for tasks worked on, with the exception of token contacts in A stages and stage B where the data represent tasks completed.

Table 4

Mean Task Completion Rate for Target Children

	Percent of Tasks Completed		
Phase	James	Mike	Lynn
A_1	72.6	68.6	75.3
B	78.6	71.6	56.0
C_1	58.8	80.8	78.7
A_2	53.7	72.7	50.0
C_2	76.2	90.9	67.0
A_3	–	100.0	–

Table 5

Mean Number of Token Contacts Received per Task and Mean Number of Independent Social Contacts Received per Task

	James		Mike		Lynn	
Phase	Token	Independent Social	Token	Independent Social	Token	Independent Social
A_1	1.0	0.3	–	–	1.0	0.5
B	1.0	1.8	1.0	1.7	1.0	2.1
C_1	2.9	0.1	2.4	0.1	2.4	0.3
A_2	1.0	0.6	1.0	0.8	1.0	0.5
C_2	2.5	0.2	2.1	0.3	2.1	0.8
A_3	–	–	1.0	0.3	–	–

variables in any one stage is the total mean number of positive contacts received per task.

It can be seen that the teacher made only one token contact per task (five tokens) in the A stages and stage B. The total mean number of positive contacts for all children during the A phases was, however, slightly more than the requested one per task (1.5). In phase B, where independent social contacts were increased, the total mean number for all three children was 2.9 per task. The total mean number was 2.7 per task in the two C stages. The requested number of positive contacts per task to be made in the B and C stages was 3.0. Thus, while in the A stages, the teacher made more positive contacts per task than was required, she gave fewer such contacts during the B and C stages. Although significant on-task differences were found in comparing baseline stages to both of the other conditions, the finding that the magnitude of the changes was so small may have been due in part to the fact that differences in the amount of reinforcement presented were less than had been expected.

In examining the teacher's behavior during the C stages, it can be seen that she was able to alter the contingencies. This is indicated by the increase in the mean number of token contacts received per task by all children, from 1.0 in A or B stages, to 2.4 in C stages; the reduction in the mean number of independent social contacts received per task, from 1.9 in stage B to 0.3 in C stages; and the finding that virtually the same total mean number of positive contacts was received per task during the B stage (2.9) and the C stages (2.7). From these data it can be concluded that while the teacher did alter the contingencies, the changes were not sufficiently effective to increase the on-task rate above that which was already produced by an increase in attention.

It is evident that positive social contacts were most influential in modifying the behavior of the target children. For one child, Lynn, negative interactions also appeared to play a major role. Throughout the study, James received an average of 0.97 negative contacts each day and Mike received a daily average of 2.7 negative contacts. This figure was inflated by one day on which five negative contacts were received. Lynn, however, averaged 3.2 negative contacts per day. More importantly, on the five days during the B and C stages where Lynn's on-task rate was highest, she received an average of only 1.0 negative contacts per day, while during the five lowest on-task days in these stages, she received an average of 5.0 negative contacts per day.

Also of interest is the relationship between the number of negative contacts received each day by all three target children and the overall class on-task average. Although no data exist to show that the teacher was most negative towards the entire class on days when she was also most negative to the target students, some preliminary hypotheses might be generated from the following finding. On the 15 days on which at least two of the target students were present, the eight lowest daily class averages were associated with 60 negative target student contacts, while the seven highest class averages were associated with only 26 such contacts. Interestingly, B and C days appeared with equal frequency in both the lower and the upper groups.

Discussion

From the data presented it appears that several conclusions can be stated: a) manipulation of teacher attention, as reflected by systematic changes in the number of independent social contacts delivered,

resulted in reliable and significant changes in on-task rate for all three students; b) the teacher did alter the contingencies, although the changes were not as pronounced as had been requested; c) the reduction in contingencies was not effective in producing additional increases in on-task rate; and d) the rate of task completion behavior did not appear to be systematically affected by the experimental manipulations.

There are no empirical data to indicate why the altering of contingencies failed to change on-task rate. Several possibilities exist, one of which is that the tokens themselves did not acquire reinforcing properties. Although the children appeared eager to work for tokens, no objective test was made (e.g., a phase without any token presentation) of their reinforcing power. Thus, each token contact may have functioned as no more than a social contact.

A second possibility relates to the relative simplicity of the tasks themselves. Throughout the study, some problem was encountered with regard to assigning tasks of appropriate difficulty and sufficient length. Since many children worked through their tasks quite rapidly, it is conceivable that it made little difference to them whether tokens were presented while they were working or at the end of a relatively short period of time.

This latter hypothesis may also partially help to explain the lack of consistent changes in task completion rate. In a study by Hall, Lund, and Jackson (1968) which did demonstrate correlated improvements in both attending behavior and academic achievement (grades), the authors emphasize that "if teachers were to use the procedures but failed to provide materials within the range of the pupil's level of skill, it is unlikely that much gain in achievement would result (p. 12)."

Finally, future investigations should give added consideration to the effects upon the entire class of modifying the behavior of several students. The present data are supportive of other recent findings which indicate that when operant procedures are applied to only several students in a class there may be an improvement in the positive behaviors of the remaining class members (Repucci & Reiss, 1970), or at least no increase in disruptive responses (Ward & Baker, 1968). Further research is needed to examine the functional relationships involved in these generalized effects.

References

Bushell, D., Wrobel, P., & Michaelis, M. L. Applying "group" contingencies to the classroom study behavior of preschool children. Journal of Applied Behavior Analysis, 1968, 1, 55-62.

Gentile, J. R., Roden, A. H., & Klein, R. D. An analysis of variance model for the intra-subject replication design. Journal of Applied Behavior Analysis, 1972, 5(2), 193-198.

Hall, R., Lund, D., & Jackson, D. Effects of teacher attention on study behavior. Journal of Applied Behavior Analysis, 1968, 1, 1-12.

Hart, B., Reynolds, N., Baer, D., Brawley, E., & Harris, F. Effect of contingent and non-contingent social reinforcement on the cooperative play of a preschool child. Journal of Applied Behavior Analysis, 1968, 1, 73-78.

McAllister, L., Stachowiak, J., Baer, D., & Conderman, L. The application of operant conditioning techniques in a secondary school classroom. Journal of Applied Behavior Analysis, 1969, 2, 277-285.

O'Leary, D., & Becker, W. Behavior modification of an adjustment class: A token reinforcement program. Exceptional Children, 1967, 33, 637-642.

Osbourne, J. Free-time as a reinforcer in the management of classroom behavior. Journal of Applied Behavior Analysis, 1969, 2, 113-118.

Repucci, N. D., & Reiss, S. Effects of operant treatment with disruptive and normal elementary school children. Paper presented at the meeting of the American Psychological Association, Miami, August, 1970.

Schmidt, G., & Ulrich, R. Effects of group contingent events upon classroom noise. Journal of Applied Behavior Analysis, 1969, 2, 171-180.

Ward, M. H., & Baker, B. L. Reinforcement therapy in the classroom. Journal of Applied Behavior Analysis, 1968, 1, 323-328.

Wrobel, P., & Resnick, L. B. An investigation of the effects of the application and removal of a token economy on the working behavior of sixteen Headstart children. Pittsburgh: Learning Research and Development Center, 1970. (Working Paper 58)